(e) *Oil radiators.* Each oil radiator must withstand, without failure, any vibration, inertia, and oil pressure load to which it is subjected during the block tests.

[Amdt. 33–6, 39 FR 35466, Oct. 1, 1974, as amended by Amdt. 33–10, 49 FR 6852, Feb. 23, 1984]

§ 33.72 Hydraulic actuating systems.

Each hydraulic actuating system must function properly under all conditions in which the engine is expected to operate. Each filter or screen must be accessible for servicing and each tank must meet the design criteria of § 33.71.

[Amdt. 33–6, 39 FR 35467, Oct. 1, 1974]

§ 33.73 Power or thrust response.

The design and construction of the engine must enable an increase—

(a) From minimum to rated takeoff power or thrust with the maximum bleed air and power extraction to be permitted in an aircraft, without overtemperature, surge, stall, or other detrimental factors occurring to the engine whenever the power control lever is moved from the minimum to the maximum position in not more than 1 second, except that the Administrator may allow additional time increments for different regimes of control operation requiring control scheduling; and

(b) From the fixed minimum flight idle power lever position when provided, or if not provided, from not more than 15 percent of the rated takeoff power or thrust available to 95 percent rated takeoff power or thrust in not over 5 seconds. The 5-second power or thrust response must occur from a stabilized static condition using only the bleed air and accessories loads necessary to run the engine. This takeoff rating is specified by the applicant and need not include thrust augmentation.

[Amdt. 33–1, 36 FR 5493, Mar. 24, 1971]

§ 33.74 Continued rotation.

If any of the engine main rotating systems will continue to rotate after the engine is shutdown for any reason while in flight, and where means to prevent that continued rotation are not provided; then any continued rotation during the maximum period of flight, and in the flight conditions expected to occur with that engine inoperative, must not result in any condition described in § 33.75 (a) through (c).

[Doc. No. 28107, 61 FR 28433, June 4, 1996]

§ 33.75 Safety analysis.

It must be shown by analysis that any probable malfunction or any probable single or multiple failure, or any probable improper operation of the engine will not cause the engine to—

(a) Catch fire;

(b) Burst (release hazardous fragments through the engine case);

(c) Generate loads greater than those ultimate loads specified in § 33.23(a); or

(d) Lose the capability of being shut down.

[Amdt. 33–6, 39 FR 35467, Oct. 1, 1974, as amended by Amdt. 33–10, 49 FR 6852, Feb. 23, 1984]

§ 33.76 Bird ingestion.

(a) *General.* Compliance with paragraphs (b) and (c) of this section shall be in accordance with the following:

(1) All ingestion tests shall be conducted with the engine stabilized at no less than 100-percent takeoff power or thrust, for test day ambient conditions prior to the ingestion. In addition, the demonstration of compliance must account for engine operation at sea level takeoff conditions on the hottest day that a minimum engine can achieve maximum rated takeoff thrust or power.

(2) The engine inlet throat area as used in this section to determine the bird quantity and weights will be established by the applicant and identified as a limitation in the installation instructions required under § 33.5.

(3) The impact to the front of the engine from the single large bird and the single largest medium bird which can enter the inlet must be evaluated. It must be shown that the associated components when struck under the conditions prescribed in paragraphs (b) or (c) of this section, as applicable, will not affect the engine to the extent that it cannot comply with the requirements of paragraphs (b)(3) and (c)(6) of this section.

(4) For an engine that incorporates an inlet protection device, compliance with this section shall be established